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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/700,020

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Yusuke Muraoka

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7590

04/19/2006

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EXAMINER

TADESSE, YEWEBDAR T

ART UNIT

PAPER NUMBER

1734

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/700,020

Applicant(s)

MURAOKA ET AL.

Examiner

Yewebdar T. Tadesse

Art Unit

1734

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 7-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 7-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al (US 2002/0160625) in view of Hasebe et al (US 5,826,129) and Wen (US 6,239,038).

As to claim 7, Inoue et al discloses (see Figs 1-2; paragraphs 25, 31 and 46) a substrate processing apparatus comprising a substrate retaining means (wafer holder 102); process solution supply means (a wet processing apparatus 1); and an anti-drying solution supply means (drying apparatus 2 having a protecting liquid supply source 105)

for supplying an anti-drying solution (deionized water) which is different from the processing solution (see paragraph 38, alkali aqueous solution provided for developing in the wet processing apparatus 1) to the substrate subjected to the wet process thereby replacing the processing solution adhered to the substrate with anti drying solution. Inoue et al further teaches (see paragraphs 38-39) rinsing (supplying of anti-drying solution to the substrate) is performed in the wet processing apparatus 1. However, Inoue et al lacks showing in the drawing the processing solution supply means (wet processing apparatus 1) supplying solution (processing and anti-drying) to a substrate retained by a substrate retaining means. It is well known in the art to retain a substrate by a substrate retaining means such as shown by Inoue et al's drying apparatus (wafer holder 102) retaining the substrate and a spin chuck 426 holding wafer in the developing unit as shown by Hasebe et al (see Fig 27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to retain the substrate by retaining means in Inoue et al to properly apply the processing solution in developing the substrate. Hasebe et al also shows (see Figs 27-30) a developing unit supplied with processing and anti-drying (rinsing) solutions supply means (440 and 453 respectively). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include processing and anti-drying solution supply means in Inoue et al system to prevent capillary force acting on the microstructure of the wafer (see paragraph 46 of Inoue et al). Wen discloses (see Fig 2) a plurality of solution supply means for supplying a plurality of processing solutions (chemical 1-3) and processing gases in a single processing unit. It would have been obvious to one of

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ordinary skill in the art at the time the invention was made to include a first and a second solution supply means for supplying a first processing solution and a second processing solution to minimize cost by creating an optimum fluid flow or use a minimum processing solution in a narrow spacing (see column 2, lines 36-50).

As to claim 8, Inoue et al discloses (see paragraph 38) a replacing solution (an organic solvent) having a higher affinity with the high-pressure fluid (carbon dioxide) than the processing solution is used as the anti-drying (rinsing) solution.

As to claim 9, Inoue et al discloses (see Fig 1, paragraphs 31 and 38-39) a substrate processing apparatus comprising a wet processing apparatus 1 treating the substrate wet with a processing solution and supplying anti-drying solution (protecting rinsing liquid) which is different from the processing solution (see paragraph 38, alkali aqueous solution provided for developing in the wet processing apparatus 1) to the substrate replacing the processing solution adhered to the substrate with the anti-drying solution. However, Inoue et al lacks teaching or showing a substrate retaining means retaining a substrate wet with a processing solution and anti-drying solution supply means supplying anti-drying solution to a substrate retained by a substrate retaining means replacing the processing solution. It is well known in the art to retain a substrate wet with a processing solution by a substrate retaining means such as shown by Hasebe et al, a spin chuck 426 of a developing unit holding the substrate wet while a processing solution applied (see Fig 27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to retain the substrate wet by retaining means in the processing of applying the processing solution in Inoue et al to develop or

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treat the substrate. Hasebe et al also shows (see Figs 27-30) a developing unit having an anti-drying (rinsing) solutions supply means (453). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include anti-drying solution supply means in Inoue et al's wet processing apparatus to prevent capillary force acting on the microstructure of the wafer (see paragraph 46 of Inoue et al).

As to claim 10, Inoue et al discloses (see paragraph 38) a replacing solution (an organic solvent) having a higher affinity with the high-pressure fluid (carbon dioxide) than the processing solution is used as the anti-drying (rinsing) solution.

As to claim 11, Inoue et al further discloses (see Fig 1 and paragraphs 25 and 29-30) a high pressure drying unit (2) for high-pressure drying the substrate by the use a high pressure fluid (supercritical fluid) and a transport unit (3) for transporting the substrate as wetted with the anti-drying solution, from the wet processing unit to the high pressure drying unit (see paragraph 38).

As to claim 12, Inoue et al discloses (see paragraph 38) a replacing solution (an organic solvent) having a higher affinity with the high-pressure fluid (carbon dioxide) than the processing solution is used as the anti-drying (rinsing) solution

With respect to claim 13, in Inoue et al (see Fig 1 and paragraph 33) the transport-unit (wafer transferring apparatus 3) wet-transportes the substrate (wafer 9) between the units and a transport container (cassettes 4-1, 4-2 and 4-3) accommodates substrates (wafers 9).

As to claim 14, Inoue et al further discloses (see Fig 1 and paragraphs 25 and 29-30) a high pressure drying unit (2) for high-pressure drying the substrate by the use

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a high pressure fluid (supercritical fluid) and a transport unit (3) for transporting the substrate as wetted with the anti-drying solution, from the wet processing unit to the high pressure drying unit (see paragraph 38).

Regarding claim 15, Inoue et al discloses (see paragraph 38) a replacing solution (an organic solvent) having a higher affinity with the high-pressure fluid (carbon dioxide) than the processing solution is used as the anti-drying (rinsing) solution.

With respect to claim 16, in Inoue et al (see Fig 1 and paragraph 33) the transport-unit (wafer transferring apparatus 3) wet-transport the substrate (wafer 9) between the units and a transport container (cassettes 4-1, 4-2 and 4-3) accommodates substrates (wafers 9).

Regarding claims 17-18 and 20, Inoue et al discloses (see Fig 1) a substrate processing apparatus comprising a developing unit (wet processing apparatus 1) performing a replacing process (rinsing) as a final processing of the developing process; a high pressure drying unit (2) for high-pressure drying the substrate by the use a high pressure fluid (supercritical fluid) contacting the surface of the developed substrate performing a predetermined surface treatment (by bringing the unit or vessel to a predetermined supercritical state, see paragraph 43) of developed substrate (wafer) and a transport-unit (wafer transferring apparatus 3) wet-transport the substrate (wafer 9) between a developing unit and a high-pressure processing unit. Furthermore, in Inoue et al the developing unit (wet processing apparatus) performs a developing process, a rinsing process, replacing (coating) process (see paragraph 27). However, Inoue lacks teaching a plurality of developing units and a transporting unit accessing a plurality of

developing units. Hasebe et al discloses a plurality of developing units (see Fig 3) and a transport unit (wafer conveyor member 196, see Figs 11-12) accessing a plurality of developing units. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a plurality of developing units and a transport unit accessing a plurality of developing in Inoue et al to improve or increase the work efficiency. Wen discloses (see Fig 2) a plurality of solution supply means for supplying a plurality of processing solutions (chemical 1-3) and processing gases in a single processing unit, the solutions capable of being developing or rinsing or replacing solution. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a first and a second solution supply means for supplying a first processing solution and a second processing solution to minimize cost by creating an optimum fluid flow or use a minimum processing solution in a narrow spacing (see column 2, lines 36-50).

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al (US 2002/0160625) in view of Hasebe et al (US 5,826,129) and Wen (US 6,239,038) as applied to claim 17 above and further in view of Jagannathan et al (US 2004/0043138). Inoue et al as modified lacks teaching a plural number of high pressure processing units. Jagannathan et al discloses (see Fig 1F) a plurality of high pressure processing units (vessels 12a) for treating semiconductor articles. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a



plurality of high pressure processing units in Inoue et al for multiple effects or to facilitate the drying process in the production of semiconductor devices.

5. Claims 21-22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al (US 2002/0160625) in view of Hasebe et al (US 5,826,129) and Wen (US 6,239,038).

In alternative embodiment, Inoue et al discloses (see Fig 3 and paragraphs, 27, 54-55) a substrate processing apparatus comprising a plurality of developing unit (two or more wet processing apparatus, see paragraph 27) for performing different developing processes on a substrate, a replacing unit (vessel 6 with liquid supply apparatus 8) for replacing a solution component adhered to the developed substrate with a replacing solution, a high-pressure processing unit (drying 2) for allowing a high-pressure fluid or a mixture of a high-pressure fluid and a chemical agent, as a processing fluid, to contact a surface of the substrate subjected to the replacing process thereby performing a predetermined surface treatment for the substrate; and a transport unit wt transporting the substrate (wafer transferring apparatus 3 transferring the wafer in the non-dried state), capable of accessing the developing unit, the replacing unit and the high-pressure processing unit, for unloading the developed substrate from the developing unit and for loading the developed substrate into the replacing unit and for unloading the substrate subjected to the replacing process from the replacing unit and for loading the substrate into the high-pressure processing unit, wherein each of the developing unit performs a rinsing process using a rinse liquid after a developing

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process (see paragraph 38). However, Inoue lacks teaching a transporting unit accessing a plurality of developing units. Hasebe et al discloses a plurality of developing units (see Fig 3) and a transport unit (wafer conveyor member 196, see Figs 11-12) accessing a plurality developing units. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a transport unit accessing a plurality of developing in Inoue et al to improve or increase the work efficiency. Wen discloses (see Fig 2) a plurality of solution supply means for supplying a plurality of processing solutions (chemical 1-3) and processing gases in a single processing unit, the solutions capable of being developing or rinsing or replacing solution. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a first and a second solution supply means for supplying a first processing solution and a second processing solution to minimize cost by creating an optimum fluid flow or use a minimum processing solution in a narrow spacing (see column 2, lines 36-50).

6. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al (US 2002/0160625) in view of Hasebe et al (US 5,826,129) and Wen (US 6,239,038) as applied to claim 21 above and further in view of Jagannathan et al (US 2004/0043138). Inoue et al as modified lacks teaching a plural number of high pressure processing units. Jagannathan et al discloses (see Fig 1F) a plurality of high pressure processing units (vessels 12a) for treating semiconductor articles. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a

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plurality of high pressure processing units in Inoue et al for multiple effects or to facilitate the drying process in the production of semiconductor devices.

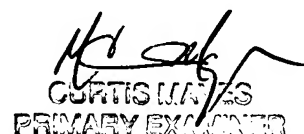
***Response to Arguments***

7. Applicant's arguments filed 04/28/2005 have been fully considered but they are not persuasive.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yewebdar T. Tadesse whose telephone number is (571) 272-1238. The examiner can normally be reached on Monday-Friday 8:00 AM-4: 30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on (571) 272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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PRIMARY EXAMINER